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The Milksnake House: Eastern Milksnake, *Lampropeltis triangulum*, Oviposition inside the Top of a Chimney

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I have lived in the same Chicago suburb, on the same block, for 40 years. My village has a man-made lake, oak-hickory woodlands, remnant patches of native plants, and a large fen. The fen is a preserve, the ownership of which is divided between Lake County (Illinois) Forest Preserve District, Illinois Nature Preserves, and Citizens for Conservation. The latter is a large, active, local conservation group that is funded by donations and staffed by volunteers. A fen is a type of wetland fed by mineral-rich, alkaline groundwater, unlike acidic bogs, and which supports specialized native plants. A survey done in the early 2000s found over 100 native plant species in our local fen, including state-threatened false asphodel, grass pink, beaked spike rush, and bog bedstraw. Additional native species found here include snakemouth orchid (Figure 1) (and other orchids), turtlehead, Kalm's lobelia, closed gentian, native yellow and pink loosestrife, and many varieties of aster. Unfortunately, much of the fen is overrun with cattails, with patches of *Phragmites* and buckthorn, and is in need of restoration.

All of this beautiful habitat supports a significant population of native herpetofauna. Eastern foxsnakes, *Pantherophis vulpinus*, are fairly common near the fen and neighbors often report seeing them. Chicago gartersnakes, *Thamnophis sirtalis semifasciatus*, and Dekay's brownsnakes, *Storeria dekayi*, also are common in the area. The lake is full of midland painted turtles, *Chrysemys picta marginata*, and common snapping turtles, *Chelydra serpentina*, with occasional spiny softshells, *Apalone spinifera*. A neighbor once called me to report she had found an escaped "box turtle" in her yard, but it proved to be a native Blanding's turtle, *Emydoidea blandingii*, that had come up out of the fen to lay her eggs in the woman's yard. I have seen six species of anuran here and also low numbers of tiger salamanders, *Ambystoma*

tigrinum, and blue-spotted salamanders, *Ambystoma laterale*. However, in all my decades of living here, until recently I had never seen an eastern milksnake, *Lampropeltis triangulum*, in this village. The closest population I knew of was about five miles away.

My wife is on the board of directors for Citizens for Conservation. A couple of years ago CFC received an email from a resident somewhere in the general area; it included an image of a snake that person had seen in her yard and a request for identification (Figure 2). The email was forwarded to my wife so that it could be passed on to me for an answer due to my well known interest in herpetology. The snake was a beautiful eastern milksnake. I replied with that information and asked where the person lived. The answer surprised me; the family lived only a block from my house and had recently moved in.

I knew the former owner of that house. He had reported seeing snakes around and inside his house with some frequency, but every one he ever showed me was either a foxsnake or a gartersnake.

The house is on a partially wooded lot and is unique in being surrounded on three sides by that beautiful fen. It is a one-story ranch house with a sunroom and wooden deck, both of which face southeast and get lots of sun. There is a small basement, perhaps 400 square feet, to hold the furnace and hot water heater and provide storage. A four-foot-deep crawlspace lies under the rest of the house. There is a working fireplace in the living room with a brick chimney that extends down into the basement on one side and crawlspace on the other to provide venting for the furnace and hot water heater.

Luckily the new homeowners, while knowing little about snakes, respect all life and accept that snakes have an important role in the ecosystem. They were eager to learn about the snakes



Figure 1. Snakemouth orchid, *Pogonia ophioglossoides*, a rare native plant found in our local fen, the presence of which confirms the quality of this habitat. Also known as adder's mouth, dragon's mouth, rose-crested orchid, and rose pogonia, the species name translates as "snake tongue." (Unless otherwise credited, images are by the author.)



Figure 2. The original image sent by a local homeowner requesting identification of this snake found in her yard. It was an eastern milksnake, *Lampropeltis triangulum*. Image by the homeowner.



Figure 3. (Left) This neonate eastern milksnake, *Lampropeltis triangulum*, was found crawling in the homeowner's yard on 21 August 2018. (Right) A second neonate eastern milksnake, this one with a large food bolus, was also seen on the crawl and photographed by the homeowner on 26 September 2018.

in their yard, how to identify them, understand their habits, and to take steps to ensure their safety. That summer they sent me several images of the foxsnakes and gartersnakes that they encountered, and in the fall they twice found and showed me tiny, recently hatched milksnakes in their yard (Figure 3). That pleased me, because it proved successful reproduction in this very focal milksnake colony.

Last summer, the homeowners undertook some home improvement projects. They replaced the wooden deck on the south side of their house. Underneath was a jumble of fist-sized rocks and dozens of shed snake skins, indicating frequent use by the local snakes. Their contractor was terrified of snakes. One morning the homeowners found a small milksnake in the construction area and put it in a container to keep it away from the contractor. They invited me to come see and photograph the

snake. While standing there I saw a gartersnake's tail protruding from under the siding of their house where it met the foundation. I also moved a small board leaning up against the foundation and uncovered a second, larger milksnake and a second gartersnake. We moved the snakes around the corner of the house and released them under a wooden walkway.

Part of the home improvement project included repair of the brick chimney. The chimney cap at the top was cracked and potentially leaking when it rained. When the mason removed the cap and a few bricks, he was surprised to find a clutch of snake eggshells inside near the very top of the chimney. The eggshells were between the outer bricks and the flue liner (Figure 4). The owners saved the eggshells and later presented them to me for identification and comment. There were 12 dried, irregular, leathery, off-white eggshells stuck together in a cluster, obviously from a snake. Eleven of them had multiple slits and were empty, indicating successful hatching. A single egg was darker than the rest and lacked slits. It was either infertile or had suffered fetal death, but by the time the eggs were found it was dry and shriveled. The eggs measured 23–31 mm × 12–18 mm (mean 28.3 mm × 15.3 mm) (Figure 5). The eggs were found on 17 November 2018, but I didn't see them until the following July. Based on the dried consistency and white, rather than brown, color of the eggs I estimated that they were from the prior summer.



Figure 4. A clutch of empty, hatched, snake eggshells as found inside the chimney between the outer bricks and flue liner just below the chimney cap. The eggs were found on 17 November 2018. Image by the mason for the Lindemann Chimney Company.

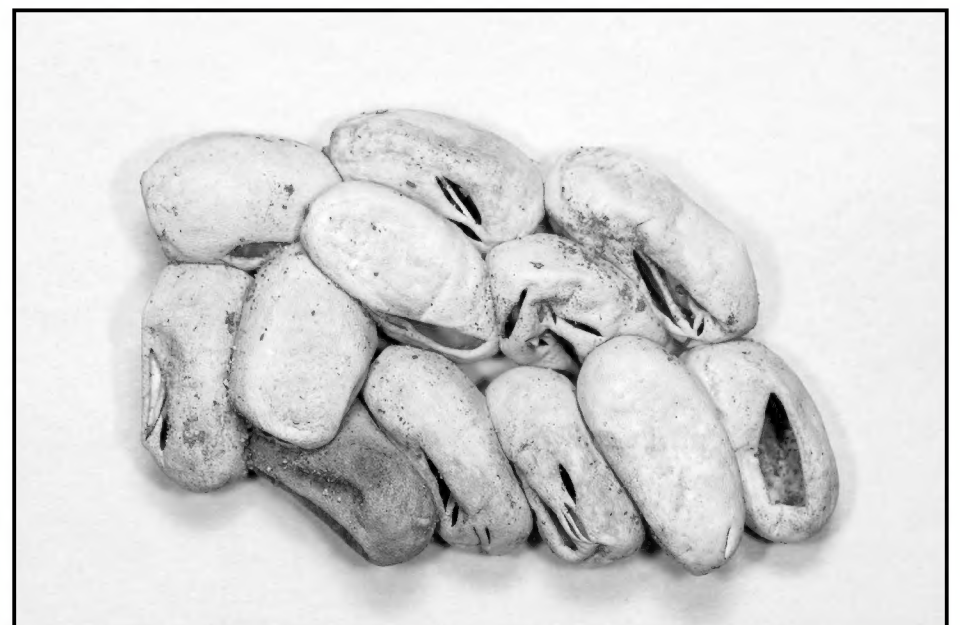


Figure 5. Close-up of the snake eggshells found inside the chimney. Note that there are 12 eggshells adhered together in a clump. All but one have multiple slits indicating successful hatching.



Figure 6. Eastern foxsnake, *Pantherophis vulpinus*, eggshells, left, and eastern milksnake, *Lampropeltis triangulum*, eggshells, right. Scale in cm. Note that the foxsnake eggs are considerably larger than those from the milksnake. Measurements are reported in the text.

The only two egg-laying snake species in this area are milksnakes and foxsnakes. I happened to have bred a captive foxsnake several years ago and saved the hatched eggshells for education purposes. Those eggs were significantly larger, measuring 40–57 mm × 23–33 mm (mean 45.8 mm × 26.7 mm, $n = 9$) (Figure 6). The obvious conclusion was that the chimney eggs were from a milksnake.

One of the homeowners' concerns during home improvements was the presence of mice in their crawlspace. The contractor thus sealed cracks between the house and its foundation. Likewise, an attempt was made to seal the crawlspace itself. After the weather turned cold last fall, they began finding snakes inside their house, both in the crawlspace and in the sunroom. Fearful that the snakes would not be able to find a way back outside in the spring due to the repairs, they brought them to me to hold over the winter for release in the spring. They found snakes irregularly throughout the winter, between one and four at a time.

Interestingly, all of the house snakes were subadults. No adults were found, although the year before a large, unidentified snake was seen in the crawlspace. Some of the snakes were tiny neonates, and some showed enough growth to indicate that they were in their second or third year. The homeowners found nine gartersnakes over the winter, all relatively the same size and likely born last summer. There were four foxsnakes. Based on their size, three of them were judged to be last year's hatchlings and one a year older. They found seven milksnakes. Four of them were tiny neonates, making it likely that they hatched inside the house and had not yet found their way outside. The other three milksnakes showed considerable growth but were not adult size (Figure 7).

All of these snakes found in the house were kept in glass aquariums with screen tops, small clay hides, paper substrate, water bowls, and plastic containers with moist sphagnum moss to provide a humidity source. The aquariums were kept in a cool basement until late March, when they were moved to a warmer basement. They were released in the owner's yard under cover in early May.

Discussion

In the wild eastern milksnakes have been recorded laying eggs in rotting logs and stumps, piles of decaying vegetation,

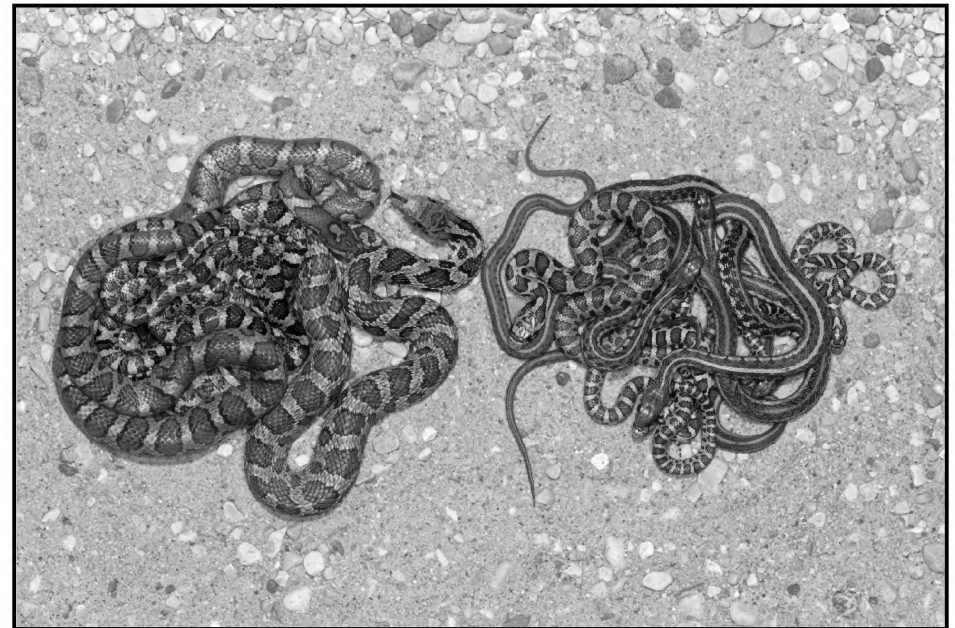


Figure 7. Some of the snakes found inside the crawlspace and sunroom of the house during the winter of 2019–2020. The group on the left contains larger but still subadult snakes: three eastern milksnakes, *Lampropeltis triangulum*, and one eastern foxsnake, *Pantherophis vulpinus*. The group on the right contains smaller, young-of-the-year snakes: three eastern milksnakes, one eastern foxsnake, and four Chicago gartersnakes, *Thamnophis sirtalis semifasciatus*.

sawdust piles, under rocks, behind the bark of trees, and in mammal burrows. Multiple females may use the same site (Henderson et al., 1980). One clutch of eight eggs was found under a decaying timber (Minton, 1971).

Eastern milksnakes frequently enter houses, basements, and foundations in the fall while searching for brumation sites (Harding, 2000). They have been reported to take up residence in a building harboring a population of mice (Barbour, 1971). In fact, another name occasionally mentioned in the literature for the milksnake is “house snake” (Wright and Wright, 1957; Harding, 2000). It is not unreasonable that they might also enter human dwellings for the purpose of egg-laying. What is unusual here is that a milksnake found a way to the top of the chimney to deposit her eggs.

Arboreal snake species have been known to deposit eggs well above the ground in tree cavities with some regularity (e.g., see Plummer, 1990). Although eastern milksnakes are said to be excellent climbers and have been reported to “rest along the rafters or other elevated timbers in a building” (Barbour, 1971), they are not generally considered arboreal in nature. In a study of eastern milksnakes in McHenry County, Illinois, 59 specimens were collected. All were found under cover on the ground (car hood, discarded rug, plywood, flat rocks) except for one crawling on the ground and two road-killed specimens (Dyrkacz, 1977).

There are two possible ways this milksnake could have made its way inside the top of the chimney. One is from the outside. There are three or four trees close to this one-story house that are tall enough for some of their branches to slightly overhang the roof. It is possible that the gravid milksnake climbed one of those trees, dropped onto the roof, and crawled from the edge of the roof across the bare shingles to the chimney near the peak of the roof. It then would have had to climb the brick chimney and find the crack in the chimney cap to enter (Figure 8). One of the most common adjectives used to describe the behavior of eastern milksnakes is “secretive” (Ernst and Barbour, 1989, Ernst and Ernst, 2003, Harding, 2000). Milksnakes often remain underground or under logs, rocks, and other cover, but are rarely



Figure 8. The chimney in which the snake eggshells were found, as seen from the driveway in front of the house after repairs were complete. For a gravid milksnake to have entered this chimney from the outside, as opposed to from inside the crawlspace, it would have had to climb an adjacent tree, drop onto the roof, crawl across the open span of shingles to the chimney at the peak of the roof, climb the chimney, and find a crack to enter near the top. This seems unlikely.

described as arboreal. Entry from the outside seems unlikely.

The other way the snake might have entered the chimney is from inside the house. The chimney extends into the basement of this house, and the furnace and hot water heater vent through the chimney. The back of the chimney is in the crawlspace. Because the house had cracks and crevices through which both mice and snakes entered with frequency, it seems likely that a snake could have entered the crawlspace and found a crack or gap in the chimney on the inside. Once the snake ascended to the top between the bricks and the flue liner, assuming adequate humidity, the sun-warmed bricks could have offered an ideal oviposition site. The recent presence of at least four neonate

milksnakes in the crawlspace suggests that another clutch of eggs hatched inside the house last fall and at least some of the neonates never made it outside. If these latest neonates also hatched in the chimney, there is a connection between the chimney and the crawlspace on the inside of the house. It is likely that the milksnake entered the chimney to lay her eggs from the crawlspace of the house rather than from the outside.

Eastern milksnake egg size has been reported as 21–35 mm × 11–15 mm (Ernst and Barbour, 1989) and 22–62 mm × 6–22 mm (mean 38.2 × 14.7, n = 91) (Ernst and Ernst, 2003). The mean size of 29 milksnake eggs from McHenry County, Illinois, was 32 × 16.4 mm (Dyrkacz, 1977). Egg size is proportional to female length. Clutch size varies from 1 to 24, average 7.6 (n = 145) (Ernst and Ernst, 2003). This is consistent with my measurements of the 12 chimney eggshells at 23–31 mm × 12–18 mm (mean 28.3 mm × 15.3 mm).

Foxsnake egg size has been reported as 29–58.5 × 14.5–30 mm, (Ernst and Barbour, 1989) and 29–61 mm × 14–30 mm, (mean 46.2 × 24.1 mm, n = 29 and 24 respectively) (Ernst and Ernst, 2003). Clutch size varies from 7 to 29. (Ernst and Ernst, 2003). This also is consistent with my measurements of foxsnake eggshells at 40–57 mm × 23–33 mm (mean 45.8 mm × 26.7 mm) and supports my conclusion that the chimney eggs were from an eastern milksnake.

Eastern milksnake eggs have not previously been reported in elevated locations.

Acknowledgment

I thank Mike Dloogatch for assistance in locating references and preparation of the manuscript.

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Solving the Mystery of Wood Frogs at Snake Road

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This, our smallest Rana, awakens, spawns, and disappears into the woods, in such quick succession that it generally escapes notice. — Wright, 1914, referring to the Wood Frog.

Abstract

Due to their cryptic coloration and habits, Wood Frogs (*Rana sylvatica*) often go unnoticed except during their brief breeding season. Wood Frogs were not detected during two herpetofaunal surveys of LaRue-Pine Hills (Snake Road), the first conducted in the 1950s and the second in the late 1980s through early 1990s. Since these surveys, several anecdotal reports of Wood Frogs at Snake Road have come to light. The provenance of these Wood Frogs has been a mystery. With the recent discovery of seven Wood Frog breeding sites in the lowlands near Snake Road, the mystery has been solved.

Introduction

Ranging from the Piedmont of northwestern Georgia, north to northern Quebec and Labrador, and northwest to the Bering Sea of western Alaska, Wood Frogs (*Rana sylvatica*) have the most extensive range of any North American frog (Dodd, 2013). In Illinois, Wood Frogs inhabit the northwestern and northeastern corners of the state, the eastern border with Indiana, and several extreme southern counties (Phillips et al., 1999). In southernmost Illinois, the species is apparently restricted to the eastern and western Shawnee Hills and the Illinois Ozarks (Redmer, 2002).

Wood Frogs are closely associated with closed-canopy forests, including deciduous, coniferous, or mixed deciduous-coniferous (Redmer, 2002; Dodd, 2013). Breeding habitat consists of ditches, road ruts, and woodland pools and ponds that typically dry annually, thus excluding predatory fishes (Dodd, 2013).

Recently, Palis et al. (2019) summarized anecdotal observations of Wood Frogs at Snake Road, LaRue-Pine Hills, Shawnee National Forest, in northwestern Union County, Illinois (see Palis [2016] for a map and description of the area). Wood Frogs are infrequently detected at Snake Road, with reports of a single observation occurring sometime between 1968 and 1971 (Ballard, 1994), and two recent observations of one frog each in 2017 and 2018 (Palis et al., 2019). The occurrence of Wood Frogs at Snake Road is something of a mystery. What is the origin of these infrequently-detected individuals? Do they represent dispersers from a distant breeding population in the Pine Hills to the east or is there a breeding population at Snake Road?

Wood Frog Observations

At 1330 CST, 3 March 2020, while walking northward along the Pine Hills bluff east of Snake Road, I heard the distinctive, duck-like “quacking” vocalizations of male Wood Frogs west of the road. The sky was clear and the air temperature was 18°C. I followed the calls westward and—through binoculars—observed a minimum of a dozen Wood Frogs at the surface of a woodland pool. By 1337 CST, I reached the shallow (≤ 11.5 cm), lentic,

clear-water pool (Figure 1). The frogs were now concealed beneath submerged leaf litter at the bottom of the pool. The water temperature was 16.5°C. I found a cluster of 15 recently-oviposited Wood Frog egg masses in water 11.5 cm deep. The approximately 27-foot-wide pool was confluent with an extensive, shallowly-flooded, lowland forest, dominated by red maple (*Acer rubrum*). The muddy, undulating forest floor alternated between hummocks, lentic pools, and a shallow spring-run. When the Wood Frogs stopped calling at the pool, I could hear others vocalizing elsewhere.

During the afternoon of 4 March 2020, I returned to the red-maple forest. Upon re-examination of the Wood Frog pool at 1455 CST, I discovered three newly-deposited egg masses in the egg mass cluster, bringing the total to 18 Wood Frog egg masses. I then left the pool and explored the surrounding area west of the road. At 1548 CST, I heard quiet, single-note “quacks” of male Wood Frogs emanating from an old, lentic, human-made ditch. The ditch, which passes through forest having a canopy of black oak (*Quercus velutina*), bur oak (*Quercus macrocarpa*), red oak (*Quercus rubra*), white oak (*Quercus alba*), sweetgum (*Liquidambar styraciflua*), white ash (*Fraxinus americana*), and shagbark hickory (*Carya ovata*), held several separate, clear-water pools of varying lengths. The



Figure 1. Wood Frog breeding pool in red maple forest, 3 March 2020.



Figure 2. Wood Frog breeding ditch in oak-hickory-sweetgum-ash forest, 4 March 2020.

shallow (≤ 15 cm), 10.5 m long $\times$ 1.5 m wide (maximum width), leaf-choked pool where the frogs had been calling contained one freshly-deposited Wood Frog egg mass in water 15 cm deep. The water temperature was 12°C. I followed the ditch southward and encountered a cluster of seven recently-laid Wood Frog egg masses in a leaf-filled pool measuring 27.5 m long, a maximum of 1.8 m wide, and up to 18 cm deep (Figure 2). The eggs were clustered in the deepest portion of the ditch. Water temperature was 12°C. Upon returning to the swampy red-maple forest, I found a single, recently-deposited Wood Frog egg mass at 1635 CST. The mass was deposited in water 4 cm deep in a clear-water pool ≤ 7.5 cm deep.

I returned to the area on 5 March 2020 to continue searching for recently-deposited Wood Frog eggs. At 1130 CST, I initiated my search in the forest southeast of the Big Muddy River levee and northeast of the railroad tracks. Air temperature was 16°C. I heard multiple choruses of Southern Leopard Frogs (*Rana sphenoccephala*), as well as calls of a single Plains Leopard Frog (*Rana blairi*) and several Spring Peepers (*Pseudacris crucifer*), but I did not detect Wood Frogs. I then drove to the south end of Snake Road, parked near the gate, and walked approximately 0.5 km north on the road and then west into the forest. At 1500 CST, I heard subdued Wood Frog calls emanating from a rectangular (90 m $\times$ 14 m) pool, presumably of human origin, within a forest composed of pin oak (*Quercus palustris*), red oak, bur

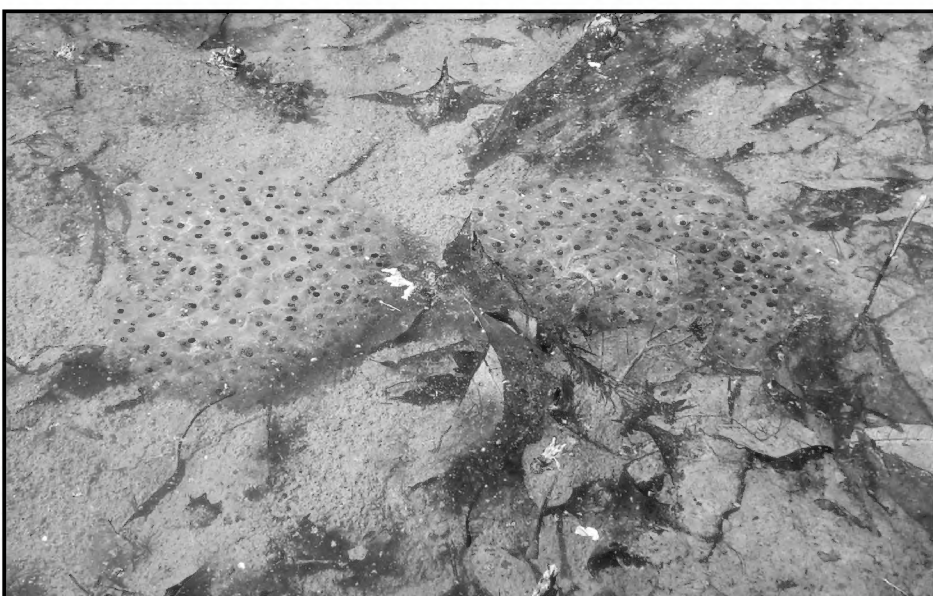


Figure 4. Two Wood Frog egg masses, 8 March 2020.



Figure 3. Wood Frog breeding pool in oak-hickory-sugarberry-sweetgum-elm forest, 5 March 2020.

oak, white oak, shagbark hickory, sugarberry (*Celtis laevigata*), sweetgum, and slippery elm (*Ulmus rubra*) (Figure 3). Air temperature was 19.5°C. I discovered 31 Wood Frog egg masses in the northeast quadrant of the pond. Three egg masses were laid singly and four clusters consisted of 4 to 10 egg masses each. I detected an additional Wood Frog egg mass in the southwest quadrant of the pond. Egg masses were laid in water ≤ 18.5 cm deep.

I conducted my final Wood Frog egg mass survey on 8 March 2020. At 1250 CDST, I detected a cluster of six Wood Frog egg masses attached to a branch in water 25-cm deep in a 1.5 $\times$ 11 m pool. This pool is within the circle of the Winters Pond parking lot near the north end of Snake Road and is bordered by a stand of black willow (*Salix nigra*). I found an additional Wood Frog breeding site west of Snake Road at 1400 CDST, approximately 1.5 km south of the parking lot, in forest composed of pin oak, cherrybark oak (*Quercus pagoda*), red oak, sugarberry, slippery elm, red maple, white ash, water locust (*Gleditsia aquatica*), sweetgum, persimmon (*Diospyros virginiana*), and bald cypress (*Taxodium distichum*). Two egg masses were deposited side by side on the bottom in water 6 cm deep within a shallow (8 cm deep), 3.5 m $\times$ 8 m pool (Figure 4). Water temperature was 16.5°C. I also observed an adult male Wood Frog at this pool (Figure 5).



Figure 5. Adult male Wood Frog found at breeding site, 8 March 2020.

In summary, I found 67 Wood Frog egg masses in seven shallow pools west of Snake Road, between Winters Pond and the south gate. Sixty-one (91%) of the egg masses were laid communally in clusters of 2–18 masses.

Discussion

Despite more than 650 hours on-site since 1996, these are my first observations of Wood Frogs at Snake Road. Wood Frogs also went undetected during two herpetofaunal surveys of the area (Rossman, 1960; Ballard, 1994). Why do Wood Frogs tend to go unnoticed at Snake Road? I suspect timing of herpetofaunal surveys, as well as the natural history of Wood Frogs, may provide the answer.

The vast majority of my visits to Snake Road occur during the road closure periods, March 15 through May 15 in spring, and September 1 through October 30 in autumn. These dates are outside the typical late February through early March Wood Frog breeding season in southernmost Illinois (Redmer, 2002). As a result, most of my visits to Snake Road do not overlap the Wood Frog breeding season. Furthermore, I visit Snake Road principally during daylight hours and Wood Frogs vocalize most frequently at night in southernmost Illinois (Redmer, 2002). Surveys conducted by Rossman (1960) and Ballard (1994) included visits in February and March, and both individuals searched the lowland forest between the road and the swamp, the area where I detected Wood Frogs. Rossman (1960:210) specifically examined “wooded lowland pools” for the presence of pond-breeding salamanders. Wood Frogs are explosive breeders, often completing breeding in less than a week (Redmer, 2002; Dodd, 2013). As such, timing is critically important in the detection of breeding Wood Frogs. It is possible that Rossman (1960) and Ballard (1994) missed Wood Frogs simply because

they were not in the right place at the right time. Furthermore, Wood Frog vocalizations have limited carrying power (Wright and Wright, 1949; Gerhardt, 1975) so they may go undetected unless the surveyor is in close proximity to vocalizing frogs.

Although the question as to whether Wood Frogs at Snake Road represent a local breeding population or waifs from a distant breeding population in the Pine Hills has been answered, the whereabouts of Snake Road Wood Frogs outside the breeding season is uncertain. In the southern portion of their range, Wood Frogs occupy relatively cool habitats including forested ravines, riparian forests, and twilight zones of caves, with individuals often sheltering within relatively deep leaf litter or within holes in streambanks (Black, 1938; Heatwole, 1961; Dodd et al., 2001; Rittenhouse and Semlitsch, 2007; Pitt et al., 2017). Wood Frogs at Snake Road may find suitable micro-habitat in the west-facing valleys, bluff crevices, and caves of the Pine Hills as well as along spring-runs in the lowlands. Two recent Wood Frog observations at Snake Road suggest that at least some individuals inhabit the Pine Hills outside the breeding season. On 3 September 2018, an adult Wood Frog was observed near the bluff (Palis et al., 2019) and on 19 March 2020, Mary Boehler, Erin Palmer, and I observed an adult Wood Frog moving towards the bluff at 1618 CDST during heavy rain. Until additional observations of adults come to light, post-breeding habitat selection of Wood Frogs at Snake Road is another mystery waiting to be solved.

Acknowledgments

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American Crows Scavenge Green Frog Carcasses

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Ripp Park and Conservancy is an 87-acre community park and natural area located on the west side of the Village of Waunakee (Dane County, Wisconsin). Wetlands border the park on the west and north and residential neighborhoods abut it to the south and east. Sixmile Creek originates south of the park in the Waunakee Marsh and flows northeast just north of the park's northwestern corner, where an accessible boardwalk provides access to the surrounding wetlands. The property's developed areas are heavily used for youth soccer, baseball, and tennis. The undeveloped stream corridor and surrounding marsh pond—popular destinations for local hikers, bird watchers, and nature enthusiasts—provide habitat for a variety of frogs and other wildlife. A recent epizootic at the conservancy's pond provided the setting for an interesting observation.

Two neighborhood residents visited the property in June 2019 hoping to observe tadpoles that they had seen during a previous visit. Upon their arrival at the marsh pond, the pair encountered dozens of dead green frogs (*Lithobates clamitans*) and very few tadpoles. After reporting their observations to the Wisconsin Department of Natural Resources' (DNR) wildlife health program, four partially metamorphosed frogs and one tadpole were collected and submitted to the National Wildlife Health Center

(Madison, Wisconsin) for necropsy. Laboratory testing confirmed ranavirus infection as the cause of death. The citizen scientists continued weekly monitoring of the pond throughout the summer and reported their findings to Wisconsin DNR staff.

During one visit to the pond, they observed American crows (*Corvus brachyrhynchos*) active near the pond. The crows were voraciously scavenging the moribund frog and tadpole carcasses from the ground. This observation is not surprising as American crows are opportunistic omnivores that consume a diverse range of fruits, seeds, nuts, invertebrates, amphibians, reptiles, eggs and small birds, mice and other small mammals, and carrion (Bent, 1946; Pough, 1949; Martin et al., 1951; Goodwin, 1976). The observation is nonetheless interesting for several reasons. First, it demonstrates the important role amphibians play as a forage base in ecosystems; "It appears that almost anything will eat an amphibian!" (Porter, 1972). Second, this is to my knowledge the first report of crows feeding on green frogs. Most of the disparate reports of crow predation on amphibians simply refer to unidentified species. Finally, die-offs due to ranavirus infection might provide a ready, but otherwise mostly unavailable, source of protein for opportunistic foragers that would not typically be viewed as frog predators.

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Notes on Reproduction of Rio Grande Leopard Frogs, *Lithobates berlandieri* (Anura: Ranidae), from Texas

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Abstract

I conducted a histological examination of gonadal samples from 44 *Lithobates berlandieri* from Texas. My two smallest mature males (sperm in lumina of seminiferous tubules) both measured 63 mm SVL. All 23 adult males in my sample (January to November) were undergoing spermiogenesis. All 20 adult females (February to November) were in spawning condition. The smallest mature female (spawning condition) measured 74 mm SVL. The presence of one July *L. berlandieri* female with postovulatory follicles (previous spawning) and concurrent mature oocytes (subsequent spawning) indicates *L. berlandieri* may spawn more than once during the same reproductive period. As previously reported, *L. berlandieri* in Texas has an extended period of reproduction. However, in contrast to *L. berlandieri* from Texas, reports from Mexico indicate reproduction is limited to wet parts of the year. Detailed examinations of *L. berlandieri* reproduction in the southern part of its range are warranted to fully ascertain the reproductive cycle of this species.

The original range of *Lithobates berlandieri* (Baird, 1859) includes southwest Texas and southeastern New Mexico into Coahuila and Chihuahua, Mexico, and south to Veracruz and Oaxaca; it has been introduced into Arizona and California (Dodd, 2013). The most detailed information on the life history of *L. berlandieri* is by Hughes and Meshaka (2018) from Texas. *Lithobates berlandieri* has been reported to have an extended period of reproduction in New Mexico (Degenhardt et al., 1996) and Texas (Dayton et al., 2007; Tipton et al., 2012). In this paper I add to information on reproduction of *L. berlandieri* in Texas from a histological examination of gonadal tissues from museum specimens. The use of museum collections for obtaining reproductive data avoids removing additional animals from the wild.

A sample of 44 *Lithobates berlandieri* from Texas collected 1945 to 2011 (Appendix) consisting of 23 adult males (mean snout–vent length, SVL = 73.7 mm $\pm$ 6.6 SD, range = 63–83 mm), 20 adult females (mean SVL = 88.6 mm $\pm$ 8.7 SD, range = 74–102 mm), and one subadult female (SVL = 70 mm) was examined from the Biodiversity Research and Teaching Collection, Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas, USA. An unpaired *t*-test was used to test for differences between adult male and female SVLs (InStat, vers. 3.0b, Graphpad Software, San Diego, CA, USA).

A small incision was made in the lower part of the abdomen and the left testis was removed from males and a piece of the left ovary from females. Gonads were embedded in paraffin, sections were cut at 5 μ m and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreiber, 1997). Histology slides were deposited at TCWC.

The testicular morphology of *L. berlandieri* is similar to that of other anurans as detailed in Ogielska and Bartmańska (2009a). Within the seminiferous tubules, spermatogenesis occurs in cysts which are closed until the late spermatid stage is reached; cysts then open and differentiating sperm reach the lumina of the seminiferous tubules (Ogielska and Bartmańska, 2009a). A ring of germinal cysts is located on the inner periph-

ery of each seminiferous tubule. All 23 *L. berlandieri* males in my sample were undergoing spermiogenesis. By month these were: January (n = 1), February (n = 2), March (n = 3), April (n = 3), May (n = 3), June (n = 3), July (n = 1), August (n = 3), September (n = 1), October (n = 1), November (n = 2). The two smallest mature males (spermiogenesis) measured 63 mm SVL, and were from June (TCWC 63765, 68063).

The mean SVL of *L. berlandieri* females was significantly larger than that of males ($t = 6.3$, $df = 41$, $P = < 0.0001$). The ovaries of *L. berlandieri* are typical of other anurans in being paired organs lying on the ventral sides of the kidneys. In adults the ovaries are filled with diplotene oocytes in various stages of development (Ogielska and Bartmańska, 2009b). Mature oocytes are filled with yolk droplets; the surrounding layer of follicular cells is thinly stretched. All 20 *L. berlandieri* adult females in my sample were in spawning condition in which mature oocytes predominated. By month these were: February (n = 2), March (n = 2), April (n = 2), May (n = 4), June (n = 1), July (n = 3), August (n = 2), September (n = 1), October (n = 2), November (n = 1). This is a somewhat longer period of female reproductive activity in Texas than reported by Hughes and Meshaka (2018) who recorded gravid *L. berlandieri* females occurred from January to September. The smallest mature female *L. berlandieri* in my study (TCWC 4353) measured 74 mm SVL, and was from August. One smaller female (SVL = 70 mm, TCWC 64479) contained yolking oocytes that were smaller than those seen in the other spawning females. These yolking oocytes were similar to Secondary Growth Stage 5 “progressive accumulation of yolk platelets” as reported in Uribe Aranzábal (2011). It is not known when this female would have reached spawning condition. I therefore considered this female to be a subadult. The high percentage of *L. berlandieri* females in spawning condition (100%, 20/20) likely reflects an extended reproductive cycle with activity both early and late in the year.

Atresia is a widespread process occurring in the ovaries of all vertebrates (Uribe Aranzábal, 2009). It is common in the am-

Table 1. Periods of reproduction for *Lithobates berlandieri* from different areas of Mexico.

Locality	Breeding Period	Source
Chihuahua	Rainy season	Lemos Espinal and Smith, 2007a
Chihuahua	Rainy season	Lemos Espinal et al., 2013
Coahuila	Rainy season	Lemos Espinal and Smith, 2007b
Durango	Wet months	Lemos Espinal et al., 2019
Hidalgo	Humid months	Lemos Espinal and Dixon, 2016
Nuevo León	Wet months	Lemos Espinal et al., 2018
Querétaro	Humid months	Dixon and Lemos Espinal, 2010
San Luis Potosí	Wet months	Lemos-Espinal and Dixon, 2013
Sonora	Spring, late summer or fall	Rorabaugh and Lemos Espinal, 2016
Veracruz	Rainy season	Guzmán-Guzmán, 2011

phibian ovary (Saidapur, 1978) and is the spontaneous digestion of a diplotene oocyte by its own hypertrophied and phagocytic granulosa cells which invade the follicle and eventually degenerate after accumulating dark pigment (Ogielska and Bartmańska, 2009b). See Saidapur and Nadkarni (1973) and Ogielska et al. (2010) for a detailed description of stages of atresia in the frog ovary. Atretic follicles were observed in (25%, 5/20) of my mature female sample. Atresia plays an important role in fecundity by influencing numbers of ovulated oocytes (Uribe Aranzábal, 2011). One October female in spawning condition exhibited a massive follicular atresia in which some mature follicles were infiltrated by vacuolated brownish granulosa cells (TCWC 90391). It is not known if this female would have spawned.

Postovulatory follicles (evidence of a recent spawning) were noted in TCWC 90371 from July. Postovulatory follicles form when the ruptured follicle collapses after ovulation; the follicular lumen disappears and proliferating granulosa cells are surrounded by a fibrous capsule (Redshaw, 1972). Postovulatory follicles are short-lived in most anuran species and are resorbed after a few weeks (Redshaw, 1972). The concurrent presence of both mature oocytes (subsequent spawning) and postovulatory

follicles (previous spawning) in TCWC 90371 indicates *L. berlandieri* females may spawn more than once in the same year.

In conclusion, my data support previous findings of others that *L. berlandieri* exhibits an extended period of reproduction in Arizona, California (Rorabaugh, 2005; Brennan and Holycross, 2009), New Mexico (Degenhardt et al., 1996) and Texas (Dayton et al., 2007; Tipton et al., 2012; Hughes and Meshaka, 2018). Moreover, observations of *L. berlandieri* tadpoles from February to September, in Central America also suggest an extended period of reproduction (Campbell, 1998). However, in other parts of its geographic range, the period of reproduction may vary. For example, in the Yucatán Peninsula, reproduction is associated with summer rainfall (Lee, 1996) and except for Sonora, Mexico, *L. berlandieri* reproduction occurs in the rainy season in other parts of Mexico (Table 1). Examinations of additional samples of *L. berlandieri* from throughout its range are needed to fully ascertain the reproductive cycle of this species.

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Appendix

Forty-four *L. berlandieri* by county from (Texas) examined from the herpetology collection of the Texas Cooperative Wildlife Collection (TCWC), Texas A&M University, College Station, Texas.

Atascosa: TCWC 4350, 4353, 4762; **Bandera:** TCWC 63913; **Blanco:** TCWC 89255; **Brewster:** TCWC 3149; **Brooks:** TCWC 62256, 62257; **Brown:** TCWC 4238; **Burnet:** TCWC 5066, 90371; **Callahan:** TCWC 90391; **Cameron:** TCWC 7148, 7149, 93093, 95151; **Concho/Coleman County:** TCWC 69357; **Crockett:** TCWC 64479; **Duval:** TCWC 79005, 79006; **Edwards:** TCWC 74902; **Jim Wells:** TCWC 63450, 63451; **Kenedy:** TCWC 4334, 4335, 93885; **Kerr:** TCWC 63912; **Kleberg:** TCWC 93887; **Mason:** TCWC 30944, 30946; **Maverick:** TCWC 63765, 63911; **McMullen:** TCWC 64113; **Reeves:** TCWC 63652; **Runnels:** TCWC 68063; **Starr:** TCWC 79002, 79003, 93167; **Val Verde:** TCWC 5950, 63656; **Zavala:** TCWC 64744, 64746, 64747, 64748.

Forty-two New Township Records for Amphibians and Reptiles in Columbia County, Pennsylvania, USA

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Although records of amphibian and reptile species within Columbia County, Pennsylvania, USA, have been noted at least since the early 1900s (i.e., Surface, 1906; 1908; 1913), I have recently undertaken to compile historic records (e.g., museum and literature records) and to expand upon these by collecting recent records regarding the occurrence and distribution of herpetofauna within this county (e.g., Hartzell, 2016; 2017). The purpose of this present work is to provide an update on recent, novel township records for amphibian and reptile species within the townships of Columbia County since the publication of Hartzell (2017), which listed records collected through mid-summer (June) of 2017. New records, listed below, are primarily the result of fieldwork by the author during which specimens were observed or captured, photographed and/or audio vouchered (when possible) and immediately released following methodology detailed in Hartzell (2017) under the auspices of a Pennsylvania Fish and Boat Commission license and Bloomsburg University of Pennsylvania IACUC approval, when applicable. Records reported herein span from late summer/fall of 2017 through November 2019. In addition to being presented here, most records (when applicable) have been submitted to the Pennsylvania Amphibian and Reptile Survey (PARS; <www.paherpsurvey.org>). Common names listed below follow Crother (2017). See Hartzell (2016) for a map of townships in Columbia County, Pennsylvania.

SALAMANDERS:

Ambystoma jeffersonianum (Jefferson Salamander): **Sugarloaf Township:** Camp Lavigne Boy Scout Camp, vernal pool associated with old Mill raceway at the mouth of Cole's Creek (41.241463, -76.366041). 18 March 2018. Several egg masses observed in pool.

Ambystoma maculatum (Spotted Salamander): **Scott Township:** Turkey Hill Oxbow Area near Papermill Rd (41.024263, -76.447144). 8 May 2018. Several eggs masses observed in marshy area.

Eurycea bislineata (Northern Two-lined Salamander): **Briar Creek Township:** Pennsylvania State Game Land 55, along State Route 1025 ca. 1 km S of Little Shickshinny Creek (41.110951, -76.281501). 26 October 2019. Adult found under cover by dry vernal pool. **Main Township:** Pennsylvania State Game Land 58, along Furnace Run (40.954932, -76.399173). 11 September 2018. Several individuals observed at stream margin. **Mifflin Township:** Andreas Rd, 2 km E of Jct with John St (41.028012, -76.281497). 10 November 2019. Adult within roadside spring.

Gyrinophilus porphyriticus (Spring Salamander): **Briar Creek Township:** Pennsylvania State Game Land 55, along Little Shamokin Creek (41.113459, -76.291677). 7 September 2019. Adult found at the margin of a headwater stream. **Main Town-**

ship: Pennsylvania State Game Land 58, along Furnace Run (40.954932, -76.399173). 11 September 2018. Adult found within spring seep.

Notophthalmus viridescens (Eastern Newt): **Briar Creek Township:** Pennsylvania State Game Land 55, along State Route 1025 ca. 1 km S of Little Shickshinny Creek (41.110951, -76.281501). 24 July 2019. Juvenile (eft phase) under rock within upland forest.

Plethodon cinereus (Eastern Red-backed Salamander): **Briar Creek Township:** Pennsylvania State Game Land 55, along State Route 1025 ca. 1 km S of Little Shickshinny Creek (41.110951, -76.281501). 7 September 2019. Redback phase adult under log in upland forest. **Mifflin Township:** Andreas Rd, 1.5 km E of Mifflinville (41.026363, -76.278722). 27 May 2019. Ledback phase individual under log adjacent to road.

Plethodon glutinosus (Northern Slimy Salamander): **Briar Creek Township:** Pennsylvania State Game Land 55, along State Route 1025 ca. 1 km S of Little Shickshinny Creek (41.110951, -76.281501). 24 July 2019. Adult under rock within upland forest. **Conyngham Township:** Weiser State Forest, Roaring Creek Tract, ridgeline 0.5 km W of Weiser Forest District Office (40.829973, -76.337457) 13 September 2018. Juvenile in rocky outcrop. **Main Township:** Pennsylvania State Game Land 58, along Furnace Run (40.954932, -76.399173). 22 September 2018. Juvenile within riparian forest. **Mifflin Township:** Andreas Rd, 1.5 km E of Mifflinville (41.026363, -76.278722). 27 May 2019. Juvenile in wooded area along a small stream. **Sugarloaf Township:** Camp Lavigne Boy Scout Camp, along Fishing Creek (41.243234, -76.373562) 22 September 2017. Juvenile within riparian forest.

FROGS AND TOADS:

Anaxyrus americanus (American Toad): **Sugarloaf Township:** Camp Lavigne Boy Scout Camp, along Fishing Creek (41.243234, -76.373562). 11 August 2018. Juvenile within riparian forest.

Hyla versicolor (Gray Treefrog): **Briar Creek Township:** Briar Creek Lake, by boat ramp (41.067753, -76.280953). 31 July 2019. Calling heard from trees along lake. **Mifflin Township:** wetlands between E 5th and E 7th Sts (41.031448, -76.302653). 3 May 2018. Large chorus of individuals calling.

Lithobates catesbeianus (American Bullfrog): **Briar Creek Township:** Briar Creek Lake (41.065926, -76.285807). 5 May 2018. Individuals observed along lake shore. **Conyngham Township:** Weiser State Forest, Roaring Creek Tract, unnamed dirt road adjacent to Kline's Reservoir (40.836739, -76.357559) 2 September 2017. Two adults on road at night. **Mifflin Township:** wetlands between E 5th and E 7th Sts (41.031448, -76.302653). 24 May 2019. Two individuals calling.

Lithobates clamitans (Green Frog): **Briar Creek Township:** Briar Creek Lake (41.065926, -76.285807). 5 May 2018. Individuals observed along lake shore. **Main Township:** 1 km E of Mainville (40.981593, -76.386529). 11 September 2018. Several individuals in moist field. **Mifflin Township:** wetlands between E 5th and E 7th Sts (41.031448, -76.302653). 11 September 2018. Adults along wetland margin. South Center Township: Small pond near JCT Wolf Hollow Rd and Lows Rd (41.036804, -76.356283). 21 July 2019. Single male calling from pond shoreline.

Lithobates palustris (Pickerel Frog): **Conyngham Township:** Weiser State Forest, Roaring Creek Tract, spring seep feeding into South Branch Roaring Creek (40.835566, -76.382047). 12 January 2018. Four individuals hibernating within seep.

Lithobates pipiens (Northern Leopard Frog): **Briar Creek Township:** Briar Creek Lake (41.065926, -76.285807). 5 May 2018. Individuals calling along lake shore.

Lithobates sylvaticus (Wood Frog): **Briar Creek Township:** Pennsylvania State Game Land 55, along SR 1025, ca. 0.5 km NW of Little Shickshinny Creek (41.115846, -76.285939). 24 July 2019. Juvenile in upland forest. **Mifflin Township:** Andreas Rd, 0.9 km E of Mifflinville (41.027311, -76.281124). 22 May 2019. Juvenile within wooded stream valley.

Pseudacrus crucifer (Spring Peeper): **Main Township:** 1 km E of Mainville (40.981593, -76.386529). 11 September 2018. Several individuals calling within moist field. **Mifflin Township:** wetlands between E 5th and E 7th Sts (41.031448, -76.302653). 3 May 2018. Multiple individuals calling. **Montour Township:** Dussen Drive near intersection with U.S. Route 11 (40.978459, -76.492746). 13 April 2019. Chorus of individuals calling from wetlands. **Orange Township:** Kocker Park (41.045936, -76.427330). 10 April 2019. Calling from wetland area.

TURTLES:

Chelydra serpentina (Snapping Turtle): **Montour Township:** Dussen Drive near intersection with U.S. Route 11 (40.978459, -76.492746). 13 April 2019. Adult within pond.

Graptemys geographica (Northern Map Turtle): **Mifflin Township:** along Susquehanna River, 0.5 km E of Interstate 80 (41.024712, -76.330069). 9 June 2018. Nesting female.

SNAKES:

Coluber constrictor (North American Racer): **Cleaveland Township:** Weiser State Forest, Roaring Creek Tract, Powerline right of way (40.833829, -76.464643). 13 September 2018. Shed skin.

Diadophis punctatus (Ring-necked Snake): **Briar Creek Township:** Pennsylvania State Game Land 55, along State Route 1025 ca. 1 km S of Little Shickshinny Creek (41.110951, -76.281501). 24 July 2019. Adult under rock within upland forest. **Mifflin Township:** Andreas Rd, 1.5 km E of Mifflinville (41.026363, -76.278722). 27 May 2019. Adult under rock adjacent to road.

Lampropeltis triangulum (Eastern Milksnake): **Conyngham Township:** Weiser State Forest, Roaring Creek Tract, ridgeline 0.5 km E of Weiser Forest District Office (40.832361, -76.325099). 25 May 2019. Juvenile within open area in upland forest.

Nerodia sipedon (Common Watersnake): **Montour Township:** Dussen Drive near intersection with U.S. Route 11 (40.978459, -76.492746). 13 April 2019. Two individuals at pond edge.

Thamnophis sirtalis (Common Garter Snake): **Conyngham Township:** Weiser State Forest, Roaring Creek Tract, ridgeline 0.5 km E of Weiser Forest District Office (40.832361, -76.325099). 25 May 2019. Individual basking in open area within upland forest. **Mifflin Township:** Andreas Rd at intersection with E Kline Rd (41.027393, -76.293482) 11 April 2019. Adult dead on road.

Acknowledgments

My thanks are due to several individuals who accompanied me in the field on excursions during which some of the records herein were observed, including Brittney Hartzell (Dieter), Corey Bower, and Nevin Raup. I also thank Kevin High for communicating to me the Mifflin township record for *Graptemys geographica*.

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A 41-year-old Red Milksnake (*Lampropeltis triangulum sypila*)

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According to <www.worldlifeexpectancy.com> *Lampropeltis triangulum sypila* has a life span of 10–12 years, while *Lampropeltis triangulum triangulum* has a life span of 12–20 years. The Society for the Study of Amphibians and Reptiles publication, *Longevity of Reptiles and Amphibians in North American Collections*, 2nd edition, 1992, records the life span of *Lampropeltis triangulum triangulum* as 21 years, 4 months, 14 days, while *Lampropeltis triangulum sypila* is recorded as 16 years, 6 months, 19 days. I have been a member of the Chicago Herpetological Society for nearly 50 years, and here report having a Red Milksnake (*Lampropeltis triangulum sypila*) in my collection that has survived for more than 41 years.

This snake was hatched in captivity on 10 September 1978 by a fellow C.H.S. member and given to the author on 15 September 1978. The snake was a hatchling from a female snake that was caught near Reelfoot Lake, Tennessee, shortly before laying eggs. The sex of this hatchling was and still is unknown. I believe it is a male, however it has not been probed for verification.

Because of the snake’s small size (not measured), I housed it in a 2½-gallon glass aquarium with a secure decorative aluminum screened top. As the snake ate and grew it was moved to a 5-gallon aquarium and eventually to the 10-gallon aquarium where it is currently housed. The substrate I have used for most of its life is commercially available small wood mulch. The snake has always been provided with drinking water in a small clay or ceramic dish with tap water from Lake Michigan (1978–1994) and untreated well water (1994–present). A clay flowerpot cut in half has always been provided for a hide box. My home where the snake has been kept has never been air conditioned so the room temperature varied in the summer months. During the heating season my house temperature remains 68–70°F. I would like to note that the snake is rarely handled, except when cleaning its cage or when assisted during shedding. This snake has always been in my possession except for a brief time in 1982 and 1983 when I loaned it to Mike Dloogatch for use at Chicago Herpetological Society exhibits. I also loaned the snake out in 1998 to Rick King for a display at the Necedah Wildlife Refuge at Necedah, Wisconsin.

The only health issue this snake has had is that it’s been blind in one eye for several years. I believe this is a possible result of the failure of an eye cap to come off during a shed and my failure to notice. Since 1996 I have had to frequently assist in removing some of its shed, especially the eyecaps. In the accompanying table I have included the shedding and food items for all 41 years but not for 2020. The snake continues to thrive.

Year	Sheds	Food items eaten
1978	2	1 small & 5 medium dead ground skinks
1979	9	5 small, 5 medium, 6 large ground skinks & 17 pinky mice (live)
1980	7	33 live mice, 18 dead frozen mice & 1 dead frozen skink
1981	11	47 live mice & 43 dead frozen mice
1982	6	64 live mice, 9 dead frozen mice & 5 small live hamsters
1983	4	40 live mice, 9 dead frozen mice & 5 small live hamsters
1984	8	14 live mice, 112 dead frozen mice, 2 small rats & 3 small hamsters
1985	6	96 dead frozen mice, 6 pinky dead frozen rats & 8 dead frozen mouse legs
1986	4	112 dead frozen mice
1987	4	81 dead frozen mice
1988	5	48 live mice, 21 dead frozen mice & 1 dead mouse
1989	5	83 live mice
1990	6	48 live mice
1991	6	26 live mice & 75 dead frozen mice
1992	4	82 dead frozen mice
1993	5	69 dead frozen mice
1994	4	23 live mice & 24 dead frozen mice
1995	4	35 live mice & 43 dead frozen mice
1996	3	23 live mice & 10 dead frozen mice
1997	2	41 live mice
1998	1	20 live mice
1999	4	49 live mice
2000	3	41 live mice
2001	4	48 live mice & 2 dead frozen mice
2002	4	61 live mice
2003	3	41 live mice
2004	4	35 live mice
2005	3	34 live mice
2006	4	34 live mice
2007	3	27 live mice
2008	3	46 live mice
2009	4	31 live mice
2010	2	49 live mice
2011	3	35 live mice
2012	3	32 live mice
2013	3	45 live mice
2014	4	40 live mice
2015	2	46 live mice
2016	2	41 live mice
2017	4	43 live mice
2018	2	53 live mice
2019	2	60 live mice

Nastycophis — a Snake as Great as its Name (Part 3)

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A unique way to get a drink of water . . .

It was the first rain of the summer here in Southern Arizona. What that often means is that there has been zero precipitation for two months or longer. These legendary “first nighter” storms (as they are called here) bring about explosive activity among the herps of the region—mainly toads. This author once viewed over 500 DOR Sonoran Desert Toads (*Incilius* [formerly *Bufo*] *alvarius*) in the late afternoon on the day after one of these first nighters. While passing through a particularly murderous stretch of highway that day, I was inspired to stop and start gathering some. I intended to take some grisly “faces of death” images of the toad carnage. I had perhaps 30 or so piled up—a creative pyramid of gore—when a concerned cop stopped to question me. Clearly suspicious, and willing to create laws to justify being a jerk, this cop informed me that I was performing an illegal act by piling up these mutilated corpses for my photo. Citing an ordinance he pulled from a dark place (which in turn was a perfect match for his personality), he told me that I must desist such activity. A decade previous to this encounter, a whop upside the head from the nightstick of an equally charming member of law enforcement had taught me never to argue with a cop. You can *never* win! If a cop tells you it is illegal to pile toad corpses into a pyramid, it is best to plead ignorance. And the fact that these toads are the breed that people smoke to catch a buzz also raised the need for caution. In the end, I thanked the cop for his creative knowledge of the local law before leaving the scene peacefully. And he graciously allowed me to leave without issuing me a citation. (The wording on any such citation would have been interesting.) As for smoking these things to get a hallucinogenic high, wow! Being a child of the ’70s, this author, as well as some of his friends, dabbled with *many* various forms of combustibles. But if at that time, somebody had told us “here, put these in your pipe and smoke ’em,” we would have been shocked into sensibility. We would have cut our hair, put on ties, got a job, and begged to be allowed back into decent society. “*Whoa dudes! Check it out. These cats are smoking toads! That’s too far out for us. It’s time to go back to squaresville!*” Fortunately for us, the fad did not exist back then. I did not learn of it until the late 1980s. I might have tried it then—strictly for scientific purposes—but could not for want of a bong big enough to hold a seven-inch-long, half-pound toad. I was also more than a little perplexed as to why they wouldn’t jump out of the bong as soon as they were torched. Smoking a sizeable moving target must be challenging, and I am left wondering how one pulls it off . . .

Getting back to first nighters, these events often have the same effect on herpers as they have on the herps. Without fail, I will *always* get phone calls and emails from my fair-weather herp buddies. They think nothing of deserting me to face the hot, drought-plagued months of May and June alone, only to surface at the first sign of an upswing. Peh! Fair-weather herpers! (Or is it “foul-weather herpers”?) During a good year, these first nighters occur in early July, and develop into every day affairs that

last until September. We call these storms “the monsoons.” I have been told by individuals here—whose temperaments are similar in nature to irritable cops—that “monsoons” is an incorrect term to use. These persnickety know-it-alls insist that “summer rainy season” is the correct term. Readers are free to take their pick. And my, how we *did* digress with these first two paragraphs! This author thinks it best to just start over again.

Without further adieu . . . It was the first rain of the summer here in Southern Arizona. I decided to duck out of work early, and head into the teeth of the approaching storm. I did not want to be near a phone or a computer, as my mission was to go enjoy this thing alone. I wanted to radio-track, and possibly witness, some drinking behavior with the herps residing on our study plot. As I was thusly plotward bound, the dark clouds swallowed the late afternoon sun, and millions of volts of Simon-pure electricity sizzled through the sky, snaking their way in all directions. Once penetrated, the clouds slammed back shut as soon as the energy that had parted them zoomed on through. The resulting resounding rumbles that followed shook the ground with a thousand reverberations. I was on the final leg of my journey to the Suizo Mountains—an 18-mile-long stretch of winding pavement—when the first big drops of rain began to fall. The storm was both a deluge and a gully-washer. The heavens opened up and let her rip. Even though my radio was up full blast, the sound of the rain smiting my truck drowned it out. Those big old raindrops cascaded downward and just seemed to totally pound everything all at once. The ditches to either side of the road immediately began to fill and flow; the raindrops smacking the wet asphalt sent mini-geysers back upward. And then, in the midst of the precipitous pandemonium, viewed from a distance of about 50 meters, a familiar form began to appear between wiper slaps and thunder claps. The brain told the foot to start applying the brakes, and the foot obeyed. As I drew to within 20 meters of the phantom form, I recognized what it was. When things came to halt, I was three meters away from it. There, in the center of my lane, standing over a meter tall, was the most enormous, jet-black Coachwhip (*Masticophis flagellum piceus*) that I have ever seen. This one was pushing—if not exceeding—six feet in length. The rear 30% of its body was hooked in a wide oxbow. This stabilizing, anchoring posture allowed for the remainder of the snake to be standing proud above the road. The main bulk of the body rippled upward in a series of lazy S-shapes, but the last six inches or so was nearly ramrod straight. The head was pointing straight up at the sky, and I was viewing that head in profile. The jowls to either side of the head were pulsating in and out rapidly. This snake was getting a drink of water from the sky! No doubt about it, the snake was snagging raindrops out of midair. And it seemed to be trying to reach upwards to the clouds to get that drink! I stared at it for fully ten seconds before I even thought of trying to get a photo. And then the fumbling required to find my camera, unzip the pouch, and remove it began. Of course, in the thick of all that flandickery,

my mind and heart filled with the tense and angst-filled thoughts that there was no way this snake would hold that pose for me. The whole while I was quietly hissing encouragement to that potential money shot of the century: “Please stay! Stay . . . stay . . . stay—yes, stay . . . no! NO! GAH!” Of course, the “GAH” came when the snake didn’t stay. I had just shut down my windshield wipers, and was going to try a shot through the glass. Camera up, aimed at the prize, and the darn thing dropped and ran an instant before the shutter snapped. Damn! The money shot of the century gone again! Were it not for bad luck, I would have no luck at all where herpetography is concerned. But still, glad I am to have witnessed it, and glad that words exist to describe such things. The event also served to remind me how great it is to be a herpetologist. Just when you *think* that you have seen it all, you learn that you have *not*!

Part 3? What in the hell happened to Parts 1 and 2?

No worries! I would say that you didn’t miss much, but maybe you did? Back in the mid-to-late 1990s, this author was writing monthly columns for the *Sonoran Herpetologist*, the monthly newsletter of the Tucson Herpetological Society. The columns that I wrote for them then were much like those I write for the *Bulletin* now. They were light-hearted and humorous, but always contained some natural history aspects of the herpetofauna under watch. Nearly 22 years ago, I wrote “Nastycophis—a Snake as Great as its Name.” It was split into two installments, which explains why Part 1 and Part 2 were added to the titles. What I didn’t realize at the time was how little there was in the literature about Coachwhips that reside in Arizona. Then, as now, I also didn’t realize exactly who, if anybody, was reading that which I wrote. Much later, I learned that a gentleman by the name of Andrew Price was paying rapt attention to those columns. The reader of this column is invited to type “Andrew Price Texas Herpetologist” into your favorite search engine. Yup! My invisible friend Andy was a go-getter in the herpetological world. One of many projects he was working on before his untimely death was writing the chapter on Coachwhips in the (hopefully) soon-to-be-published book *Snakes of Arizona*. In April of 2018, Andrew Holycross, who is the lead author and chief editor of this book, sent me the Coachwhip chapter to review. My eyes went out on stems when I saw how many times I was cited in this chapter. The bulk of these citations came from those two Nastycophis articles. Of course, during the 20 years that passed before this chapter was in front of me, I had personally witnessed many more amazing Coachwhip-related events. And like Andy Price, I stored many of the observations and photos of others that were shared with me. Unfortunately, the formal Coachwhip book chapter came my way at the point in time where it was deemed finished. Any new information I might have contributed would have to await a different publication. Truth be told, the chapter is *great* without my input. But there is no doubt it would be better with it. It is in that spirit that I write this Part 3. I hope to pick off that which was missed, and augment that which wasn’t. And perhaps 20 years from now, somebody else might actually read this column, and find something herein that is worth citing.

Nastycophis—where did *that* come from?

I invented the word “Nastycophis” in the mid-1980s, when I was first learning the Latin names of our local Arizona snake

species. I was in my early 30s then, and can point to apathy as being the main reason that I waited so long to start the learning process. I played word games in my head to help me to remember all these new and convoluted names. The irascible disposition of Coachwhips can be summed up with many different words. Nasty is one of those words. The mental game that helped me to remember the genus name *Masticophis* was to change the first five letters of the word from “Masti” to “Nasty.” According to an impeccable but humble-to-a-fault source, the translation of *Masticophis* is “whip serpent.” Good one! But I was more than a little disappointed to learn that the translation was not “all teeth at one end, all musk at the other, and just plain *nasty* from stem to stern.” I’d be willing to bet that as soon as these words are read, at least a dozen of my readers (like I have that many?) are entering “snit mode” over me claiming Nastycophis as my own. In *their* minds, *they* created the term! They are probably right. If I thought of it on my own, so could have they. So what? Let’s just humor this author a moment, and pretend that the good old Herp King of Southern Arizona *did* create this term. What do I get for it? What’s my prize? Do I get an audience with the President or a kiss on *my* ring from the Pope? Nothing! That’s the recognition that one can expect for performing great deeds in herpetology. Maybe I *did* invent the term, and it has since traveled around the world? If that is the case, I *still* get nothing for it! Welcome to the world of herpetology, where those involved passionately give their all to pursue the elusive prize of . . . what? What exactly does all the effort we spend seeking the glory of that good image; that over-the-top exquisitely written observation; the stuffing our heads with loquaciously long scientific jargon; the vicious infighting with colleagues—what exactly does all that effort gain us? Nothing! Personally, all I have to show for it is holes in both my hands from where the money that I have invested in this worthless field went burning through! Every time that I wave my hands in the air in despair, or even just walk down the street, my hands make an annoying whistling sound. And through it all, I just wish that I could live another 100 years, so that I could accomplish even *more* great deeds that earn me *nothing*! I wish there was two of me, so that I could produce twice as much nothing. $2 \times 0 = ?$

Moving right along . . . With so many stories that highlight the legendary viciousness of Coachwhips circulating amongst fellow herpetologists *and* around the internet, I limit myself to just one. Last month, I regaled you with stories of how I let any Coachwhip that I capture bite me first, and then, with confidence, scoop it off the ground to free-handle it. I also suggested that the snake often seems to recognize being on safe ground with the handler, while any or all who approach are still viewed as potential recipients of a snake-induced hickey. I also mentioned that controlling the head means hiding the oftentimes beautiful pattern on the head and neck area of the snake. Yeah, I wrote all these things last month. There—I’m all done citing myself—without actually citing myself.

The herpetological world is full of “Coachwhip bites man” stories. It really doesn’t hurt much, and the red badge of courage aspect of a Coachwhip bite will not garner much respect from circles of case-hardened herpers. The image in Figure 1 is not a great image. It is the setup for a different kind of “Snake Bites Man” story. The fact that Figure 1 cost the photographer \$500 to



Figure 1. A \$500 image! Moments after this image was taken, the Coachwhip depicted destroyed the camera of the photographer. See text for details.

produce merits the valuable space required to publish it. In this image, those with good eyes will see what the author means about the pattern of the head and neck area of a Coachwhip. We also see the handling technique. No attempt was made to control the smart end of this snake. When the photographer moved in to get a close-up of the pattern on the head and neck, the snake launched a strike in his direction. That strike scored a direct hit on the camera, and knocked it clean out of his hands. It went clattering to the ground. That was the end of the camera, which had been purchased specifically for this Arizona visit. As soon as it was ascertained that the camera was no longer functioning, there began a spirited conversation between the two herpers involved. Each side was convinced the other was responsible for the misdeed, while the snake who caused it all got off scot-free. I have had enough of these sorts of discussions with my wife to know that I am *never* right. But I was *not* going to admit to any wrongdoing here. (*Especially* considering that any admission of guilt might lead to me having to purchase a new camera for my friend. Five hundred dollars for this image? Screw that!) Fortunately, before the conversation grew too heated, we backed off, and let it all blow over. Almost exactly ten years to the day later, while preparing this article, I sent Figure 1 back to the photographer, and inquired if he had anything better of that particular

snake. I was hoping for something like a close-up of a gaping, toothy mouth taken a split second before camera doomsday. I did not receive a response to this inquiry, which may or may not mean anything. Rather than risk asking again, I choose to go with what I have (and likely get to keep both the photo *and* the observation in this piece as a result). Meanwhile, I ask the reader: *How in the hell could this be my fault?*

Some notes and images of Coachwhip reproduction in Arizona

Prior to writing this section of this column, I went to seven local herpetologists with a very simple question. That question was: “Have you ever seen two (or more) Coachwhips together in the wild?” The seven people I contacted can be relied upon for an honest answer with their herpetological observations; have all spent a lot of time in the field; and all have considerable experience observing overwintering Western Diamond-backed Rattlesnakes (*Crotalus atrox*). I count myself as number eight in this little survey of mine. We *all* answer “no” to the question of seeing two or more Coachwhips together. I am estimating that as a group, the eight of us have easily spent over 100,000 hours in the field seeking such events. That is the equivalent of one person spending over 50 years of 40-hour work weeks just herping away the days. Sounds like a good life! Counting myself, three of the eight of us were quick to consider a brief list of other species of “common” snakes we also have never seen paired. The rationale that we use in making the mental “no pairing” list is to imply that it is no big deal to have not seen pairings of Coachwhips. But having way over-thought this notion, it is my opinion that pairs of Coachwhips are conspicuous in their absence. That is especially true when one considers the fact that across this great nation of ours, several species of overwintering or hibernating rattlesnakes share their dens with various types of racers (*Coluber*) and whipsnakes (*Masticophis*). Please refer to Figure 2 for an example of commensal denning between whipsnakes and rattlesnakes, something that does not seem to occur between Coachwhips and rattlesnakes. After decades of watching over 60 aggregate *Crotalus atrox* dens, I have three observations of a single Coachwhip seen prowling the apron just outside a den, and only one observation of a lone Coachwhip being inside. The lone observation of a Coachwhip

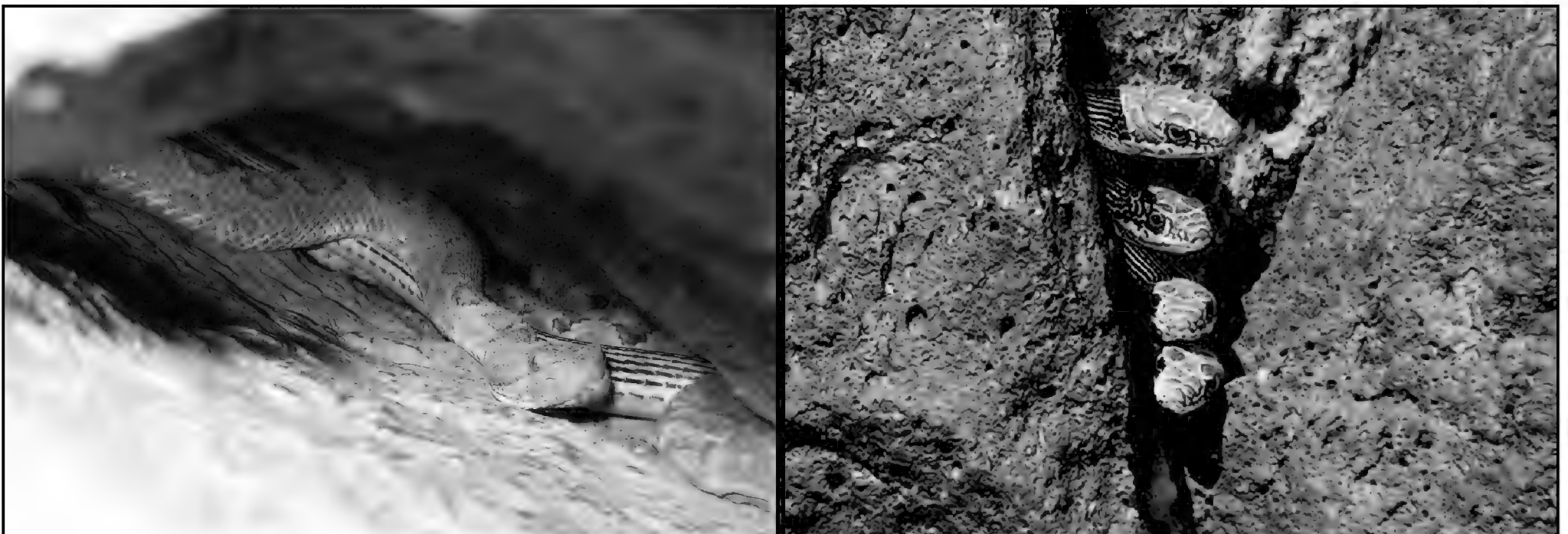


Figure 2. (Left) A Striped Whipsnake (*Masticophis taeniatus*) sandwiched between two Great Basin Rattlesnakes (*Crotalus lutosus*) in an aggregate crevice den in Nevada. Image by the author. (Right) Four Striped Whipsnakes viewed peeking out at photographer Blake Thomason from an extension of the crevice viewed in the image to the left. The author includes these images to demonstrate that commensal denning with rattlesnakes with most species of the *Masticophis* complex is commonplace. However, it is unheard of with Coachwhips in Arizona. (How the author *wishes* it were otherwise!)



Figure 3. Coachwhips photographed together on 9 April 2014. Image by R. C. Clark, Dancing Snake Nature Photography. See text for details.

inside a den was under a massive piece of caprock roughly ten meters in diameter. The Coachwhip was under the southeast side of this boulder, while the *atrox* were under the northwest edge. They were as far apart as they could get and still be considered in the same refugium. While I still have six years of numbers data to gather regarding the herps under my watch, the 411 Coachwhips encountered thus far makes them second only to Sonoran Gophersnakes ($N = 537$) in numbers of non-venomous wild snakes that I have seen. Going zero for 411 with regards to pairings with Coachwhips is at least starting to point to something that is only rarely observed. Tack on 100,000 field hours (likely more) among eight stalwart Arizona herpetologists, and we push the limits of witnessing a pairing even being possible.

There are only so many reasons that Coachwhips could pair up. The possibility of communal overwintering with rattlesnakes has already been discussed. Three other possibilities are courtship, mating or combat. Like some species of rattlesnakes, they might get together simply to keep tabs on each other. They might accidentally cross paths with each other. Finally, one might wish to eat the other. As I have already admitted, I have nothing of my own to contribute regarding pairing for any reason. However, I do have friends who have witnessed and photographed it happening. It is an event that has only been documented four times in the history of Arizona Herpetology, and one of those events was on 29 May 1912. (Holycross pers. comm. 2018, from Van Denburgh and Slevin, 1913). Two of the three incidents that follow in this account have never before been published. On 9 April 2014, at ~0800 hours, René Clark was hiking along a trail in Sabino Canyon State Park when she

encountered the pair viewed in Figure 3. According to René, there were none of the twitchy, jerky movements commonly associated with courtship. After staying together a few minutes, the pair, evidently spooked by the presence of the hikers, went their separate ways. We can only speculate as to what might have happened had they not been disturbed. Later in the day, as it heated up, this pairing might have developed into courtship or possibly even mating.

Young Cage may have been the only person in all of Arizona herpetological history to witness a prolonged courtship and mating episode with Coachwhips. Unfortunately, Mr. Cage has been dead for many years now. That would normally be the end of his observation, but I was actually aware of this one shortly after it happened. Young lived in Dove Mountain Estates, which is located in the Southwestern Tortolita Mountains, on the far north side of Tucson. Extraordinary natural events, herpetological and otherwise, abounded in his neighborhood. And Mr. Cage was *always* ready to exploit them with his camera as soon as he got word of them. During the late morning of 24 May 2008, Young received a phone call from one of his neighbors, who told him that there were mating Coachwhips in their yard. When he arrived at the house where the reported mating was ensuing (exact address unknown), he was pleased to see that there were indeed a pair of Coachwhips. But they were in courtship mode, not actually mating. He stuck with them for a while, got some photos, and left. When he got the phone call the following morning that indicated they were still together, he headed back over. Just before noon, they were mating. Were it not for Young's willingness to share his images with me, another rare herpetological behavioral observation would have been taken by the Grim Reaper. That seems to be the rule rather than the exception in Tucson. Please refer to the images in Figure 4. The lesson here is clear to me, and ought to be clear to all readers. When you witness something noteworthy like this, it is best to publish it *somewhere*—sooner rather than later. Brian Sullivan, of Arizona State University West Campus did not wait to publish *his* mating observation. On 15 May 2014, Brian was blessed to witness and photograph a pair of Coachwhips in coitus on the gravel road that leads to his study spot (Sullivan, 2014). He was kind enough let me use one of his images for this column (Figure 5).

As for the other side of reproduction, the egg-laying, that is something that I will never see in the field. Neither will anybody



Figure 4. (Left) A pairing of Coachwhips observed on 24 May 2008. (Right) Almost exactly 24 hours later, on 25 May, the same pair is observed mating. The event occurred at Dove Mountain Estates, located at the extreme northern edge of Tucson. Images by Young Cage.

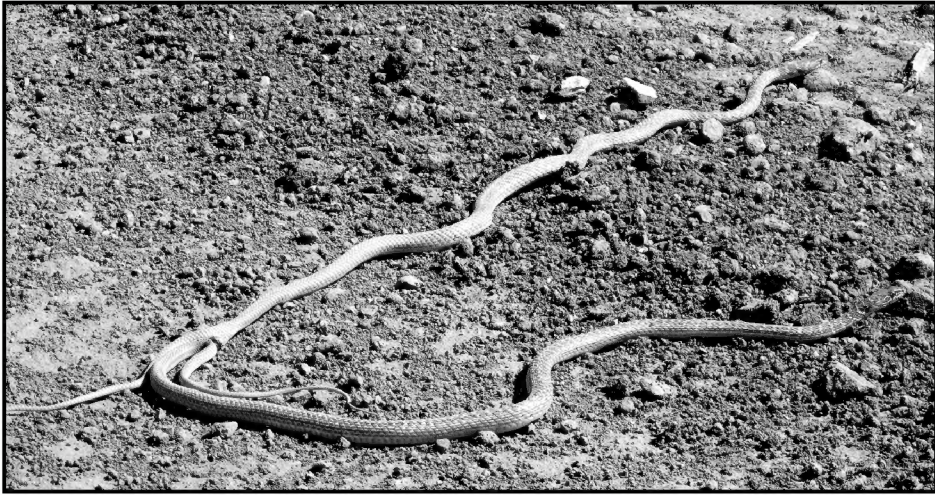


Figure 5. Coachwhips in coitus, near Cave Buttes Dam, northern Phoenix metropolitan area. Image taken 15 May 2014 by Brian K. Sullivan.

else. We can be thankful for the work of Dr. Stephen Goldberg, who remains a constant in publishing the sort of herpetological reproductive information that can *not* be witnessed by even the best of our field observations. In a nutshell, Goldberg's work with Arizona Coachwhips revealed anywhere from 2 to 12 follicles at various stages of development. With nine of the reproductive females that he examined, there is strong evidence that their eggs would be oviposited late June or July (Goldberg, 2002). As for hatching, Andy Holycross examined 18 preserved museum specimens from Arizona. These were labeled as juveniles, and all had been captured "August or later" (Holycross, pers. comm., 2018). Andy's diligent observations of August or later hatchlings dovetail nicely with what this author has witnessed. I have not gone to any effort to go through my notes to see how many hatchlings I can shake out. When that time comes, I expect there will be well over 20. I did accidentally uncover three hatchlings while seeking other things. These three

serve to back the "August or later" observation of the formalin-snorting Dr. Holycross. I saw the first on 11 August 2001; the second on 27 August 2008. For the third and best, I have an image to share (Figure 6). The young grow rapidly, and within a year of birth, radically begin to change color and pattern (see Figure 6, right side image). There is no small measure of hometown pride when the author states that the color options that an adult Coachwhip can exhibit are at their greatest variety within 50 miles of Tucson. We seem to be at the epicenter of color morphs here in Tucson. They can be all tan, to all red or all pink, to all black. The combinations of a darker-colored head and neck to many colors distally can also be seen locally.

The wrap-up of Part 3, and the promise of Part 4

I was over 2100 words into what was initially going to be included with this column when I put on the brakes. I was describing the many feeding observations that have come my way. Oh my! Do I *ever* have a ton of them! From lizards to birds to rabbits to other snakes to true cannibalism, if we don't have it all, we have more than anybody else will *ever* accumulate. But we are at a good point to end Part 3. As much as I have enjoyed bringing four months of *Masticophis* to your reading room (perhaps the same room that contains the porcelain god?), it is time to move on to other subjects. Oftentimes when I write these columns, I learn more than any of the readers can ever pick up on by reading them. This was one of these columns. With that which was presented here, and what is waiting in the weeds, I have learned that *Nastycophis* is indeed a snake that is as great as its name. This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

Literature Cited

- Goldberg, S. R. 2002. Reproduction in the coachwhip, *Masticophis flagellum* (Serpentes: Colubridae), from Arizona. *Texas Journal of Science* 54(2):143-150.
- Sullivan, B. 2014. Mating in the coachwhip *Masticophis* (= *Coluber*) *flagellum*. *Sonoran Herpetologist* 27:78.
- Van Denburgh, J., and J. R. Slevin. 1913. A list of the amphibians and reptiles of Arizona, with notes on the species in the collection of the Academy. *Proceedings of the California Academy of Science, Fourth Series* 3:391-454.

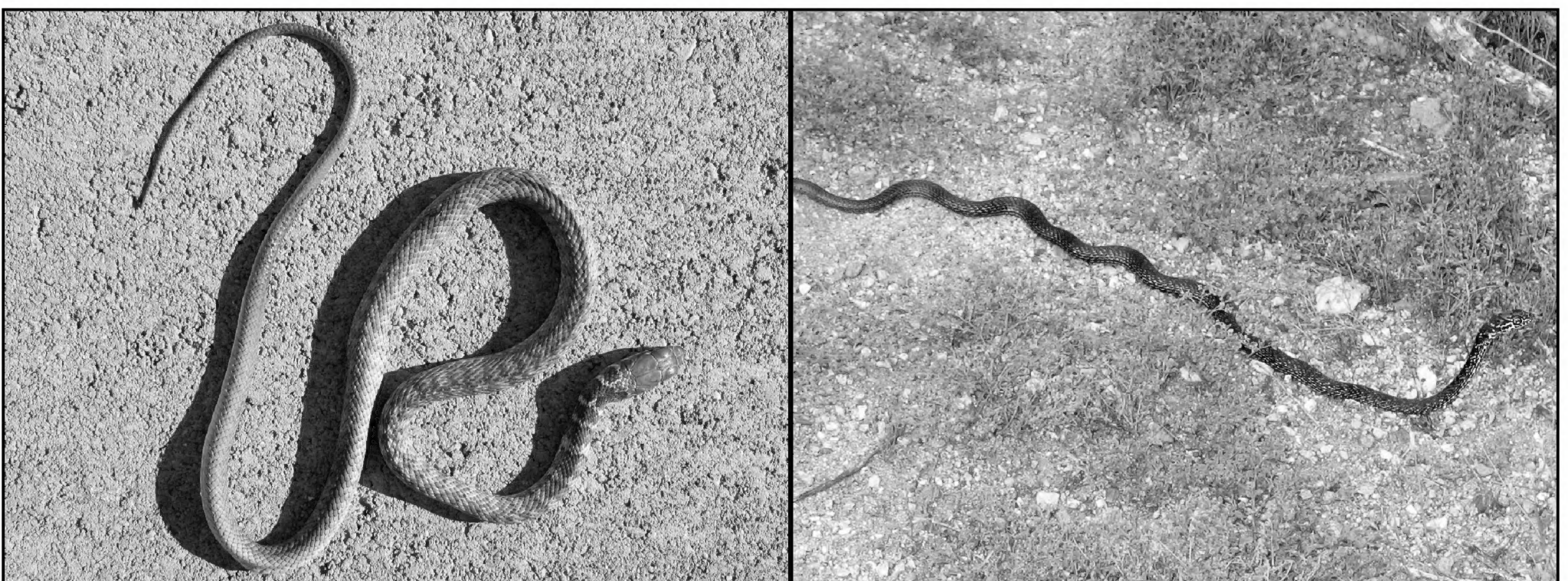


Figure 6. (Left) A road-killed hatchling Coachwhip found near the author's house on the northwest side of Tucson, 26 August 2006 (Right) While the hatchlings in the vicinity of Tucson all look similar to the one in the image on the left, those that survive their first year can dramatically change color and pattern into a wide variety of color morphs. This specimen, photographed on 21 September 2007 in Suizo Wash, Pinal County, Arizona, is probably just over one year old. It is well on its way to becoming an all black individual. Images by author.

Minutes of the CHS Board Meeting, June 4, 2020

The June 4 board meeting was conducted via a Zoom video conference. John Gutierrez called the meeting to order at 7:40 P.M. Board member Jessica Wadleigh did not participate. Minutes of the April 9 board meeting were accepted.

Officers' reports

Treasurer: John Archer briefly summarized the May financial reports. The insurance policy covering the CHS board of directors is up for renewal in June. Our agent has recommended switching companies, which will provide a small savings in premium. John moved to switch the provider of the CHS board of directors coverage to the Cincinnati Insurance Company. The motion passed unanimously. Our agent has also recommended that we drop our general liability policy if we have not yet resumed general meetings and shows when it comes due for renewal.

Membership secretary: Mike Dloogatch read the list of newly expired memberships.

Committee reports

Shows: Cannot resume until stay-at-home order has been lifted.

Junior Herpers: Frank Sladek tried to see if parents and kids would participate in an online meeting but few were interested.

Old business

CHS trailer: Bob Bavirsha found that the "For Sale" sign had fallen off and has replaced it..

The meeting adjourned at 8:35 P.M.

Respectfully submitted by recording secretary Gail Oomens

Advertisements

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , \$25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), \$27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm), \$30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), \$35/100 Contact Kelly Haller at 785-224-7291 or by e-mail at kelhal56@hotmail.com

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

NEW CHS MEMBERS THIS MONTH

Lorca Jolene

Jamie Miller

From the company that developed the **first UVB lamp** for reptiles 20 years ago...

T5 HO UVB



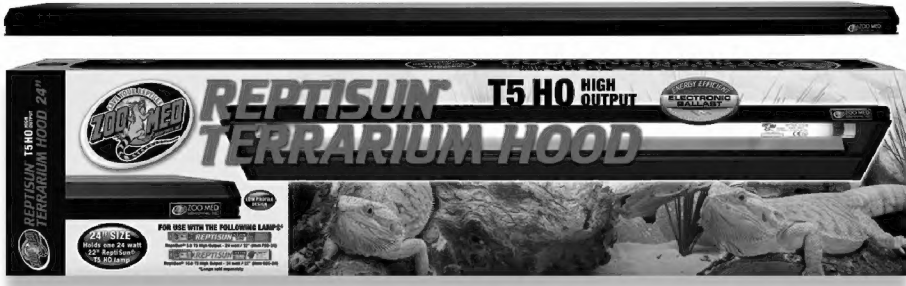
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UPCOMING MEETINGS

The June 24 meeting of the Chicago Herpetological Society has been canceled.

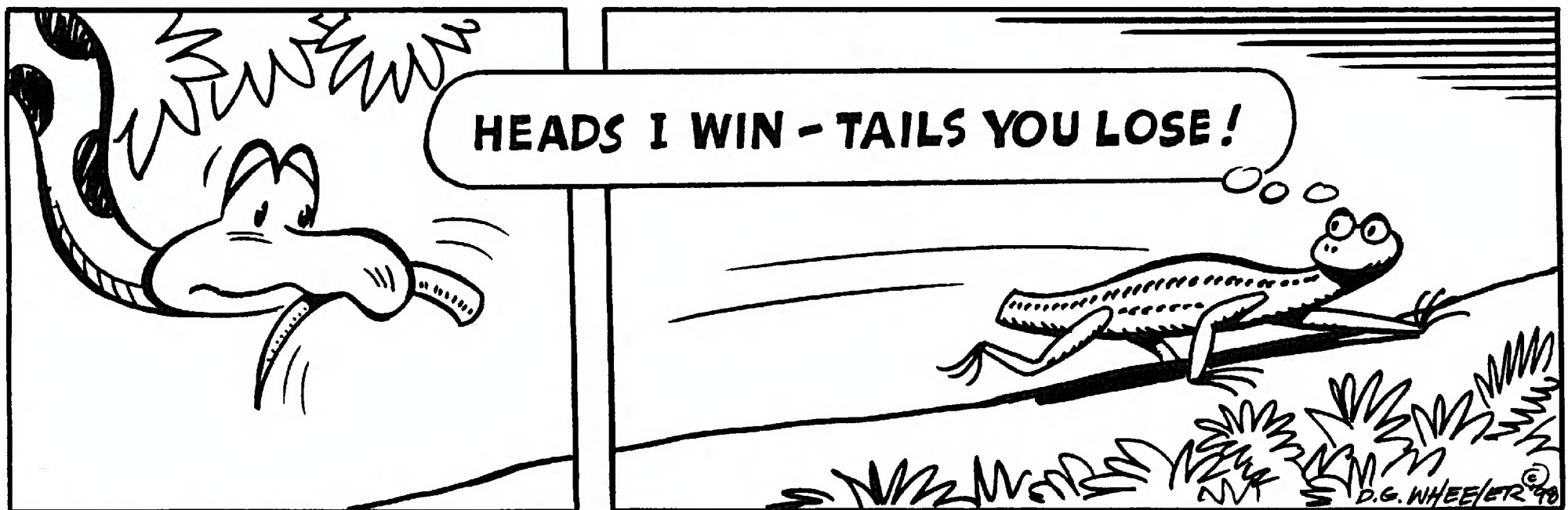
The July 29 meeting has not yet been canceled, but it probably will be.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? The next board meeting will be held online. If you wish to take part, please email mdloogatch@chicagoherp.org.

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